

REMARKS/ARGUMENTS

Claims 30 – 39 and 43 – 57 are pending in the application.

With regard to the misnumbered claims, the inadvertently misnumbered claims (which were correctly numbered in the previous amendment dated May 28, 2003) have been amended.

The Examiner is thanked for the indication that claims 33, 34, 55 and 57 would be allowable. However, in view of the following comments, it is respectfully submitted that all of the claims that are pending in the present application should be allowable.

The Examiner has rejected, among others, claims 30 and 51 as being obvious over a combination of four different references. Among these references is the newly cited Tung reference, which the Examiner has cited to address Applicants' limitation of "a single means for rotating both said substrate holder and said cover". However, it is respectfully submitted that the Tung reference is not a proper reference, since the priority date of the instant application, namely February 16, 1999, is prior to the December 15, 1999 filing date of the Tung reference. A literal translation of Applicants' priority application is enclosed.

Although it is respectfully submitted that already since the Tung reference is not a valid reference, the pending claims should be allowable; nonetheless, the following comments are offered.

Applicants' apparatus claim 30 (and similarly for Applicants' method claim 51) provides, among other features, a cover 20 that is securable to the substrate holder 5 such that the cover is freely rotatable therewith. In view of this ability to secure the cover to the substrate holder, Applicants' coating apparatus does not require a second

means for rotating the two components, since as defined in the claims the cover 20 is securable to the substrate holder 5. As a further clarification of this feature, claim 30 provides for a single means for rotating both the substrate holder 5 and the cover 20. As pointed out previously, in contradistinction to this requirement of Applicants' apparatus as defined in claim 30, the prior art requires two separate rotating means.

With regard to the rejection of the claims of the instant application over a combination of at least four different references, it is respectfully submitted that first of all it would in no way be obvious for one of ordinary skill in the art to combine isolated features of the various references in order to come up with the subject matter of Applicants' claims 30 and 51. In other words, pursuant to MPEP sections 2143.01 and 2145X.C., there must be some suggestion or motivation to modify or combine reference teachings. It is respectfully submitted that the Examiner has provided no suggestion in the prior art of the desirability of combining the references in the way undertaken in the present Office Action. The Examiner's attention is also respectfully directed to MPEP section 706.02(j). Furthermore, it is respectfully submitted that a combination of the cited references would not lead to the subject matter of Applicants' claims 30 and 51.

In particular, Yen discloses an apparatus for coating a substrate and is provided with a rotatable substrate holder on which a substrate that is to be coated is placed so that the surface that is to be coated faces upwardly. The substrate holder is coupled via a shaft with a motor in order to be rotated thereby. Yen furthermore provides a cover that is in moveable contact with the substrate holder in order to form therewith a chamber for receiving the substrate. The cover is coupled via a shaft with a motor in order to be rotated thereby.

With the apparatus of Yen, during the coating of the substrate a complicated synchronization of the rotation of the substrate holder with the rotation of the cover is required, since each of the two elements is driven by its own motor. If an appropriate synchronization is not effected, friction can occur between the elements that produces wear and furthermore adversely affects the integrity of the chamber formed between the elements. In order to avoid such a synchronization, with the present invention a cover is provided that is securable to the substrate holder such that the cover is freely rotatable therewith. Thus, during operation a fixed connection is formed between the cover and the substrate holder. The cover is thus automatically rotated in common and synchronously with the substrate holder, and in particular by a single drive means.

It is thus respectfully submitted that claim 30 of the instant application already clearly differs from the device of Yen with regard to the securement of the cover to the substrate holder. Furthermore, the apparatus of Yen also differs with regard to the orientation of the substrate as defined in Applicants' claim 30.

In addition, with the apparatus of Yen there exists the problem that material residue that is flung off from the substrate during the rotary coating process contacts the substrate holder and collects therein, which can adversely affect subsequent coating processes and furthermore is associated with the risk of contaminating the underside of the substrate. The danger of contamination of a backside of a substrate due to flung-off material residue is resolved with the present invention in that, among other features, the substrate surface that is to be coated is directed downwardly, and material residue is moved away from the backside of the substrate already due to the centrifugal force.

The present invention as defined in claim 30 furthermore provides for a notch in

the outer region of the portion of the cover that defines the chamber, whereby the notch tapers radially outwardly and is inclined on the side thereof that faces the substrate holder. The formation of the notch in the outer region ensures that flung-off material residue is reliably conducted away from the region of the substrate and also from the substrate holder by centrifugal forces that occur during the rotation, thereby protecting against contamination. Due to the inclined configuration of one side of the notch, conducting contaminants away from the substrate and the substrate holder is further enhanced and improved. It is respectfully submitted that the feature of such a notch is neither taught nor suggested by Yen, thus providing a further distinction of Applicants' claims 30 and 51 from the Yen reference.

The Kameyama reference relates to an apparatus for producing semiconductors, and is provided with a container that contains a processing liquid, and is also provided with a substrate holder that holds a semiconductor wafer such that the surface that is to be treated faces downwardly. The container that contains the processing liquid, and/or the substrate holder, are moveable toward and away from one another in order to immerse the wafer at least partially in the processing liquid. It is respectfully submitted that Kameyama discloses neither an apparatus for coating substrates as required by claim 30, since no coating is addressed by Kameyama, nor a cover that is securable from the substrate holder. Thus, Kameyama can also not suggest means for rotating both a substrate holder and a cover, and certainly not a notch with a specific configuration in a cover.

Thus, the only feature of Kameyama that can be pertinent to the instant application is the arrangement of the substrate such that a surface that is to be treated

faces downwardly to keep the surface that is to be treated from being contaminated with dust or the like. Kameyama provides no precautions for protecting the backside of the wafer from contaminations; as shown in Fig. 1, the backside of the wafer is apparently at least partially exposed in an upward direction.

In contrast, with the present invention the surface that is to be coated is held in a downwardly directed manner, thus ensuring that coating medium that can be flung off from the substrate cannot come into contact with the backside of the substrate, as clearly discussed, for example, on page 3, starting at line 20, of the specification of the instant application. It is furthermore respectfully submitted that Kameyama and the present invention therefore have entirely different objectives with regard to the orientation of the substrate, which can be attributed to the fact that the present invention is related to a uniform coating of the substrate with the coating material that on the backside of the substrate could adversely affect the functionality thereof, whereas Kameyama relates to the treatment of a wafer with a liquid, where a contact of the liquid upon the backside of the wafer is not critical. It is therefore respectfully submitted that one of ordinary skill in the art would not combine Yen and Kameyama with regard to this feature for achieving the inventive goal of protecting the backside of the wafer for the reasons discussed above, especially since the specific arrangement of the substrate according to the present application cannot be viewed in an isolated manner, but must be seen in combination with the remaining features of Applicants' claims with which it cooperates, such as the notch in the cover, in order to ensure that no coating medium can pass to the backside of the substrate. Since Kameyama does not address the protection of the backside of a wafer from contaminants, it is respectfully submitted that

one of ordinary skill in the art would not look to this reference for a resolution of the problem of how to protect the backside of a wafer.

As discussed above, Tung is not even a proper reference. Nonetheless, the following comments are offered with regard to this reference. In particular, Tung relates to an apparatus for protecting the backside of a wafer during a fluid treatment of the front side of the wafer. For this purpose, the apparatus has a wafer holder that carries the wafer in such a way that the surface that is to be treated faces upwardly. In addition, a cover is provided that can be moved toward the substrate holder to form a closed chamber, and can be moved away from the substrate holder.

Pursuant to column 3, rows 30 – 34, of Tung, the top cover 80 can be synchronously rotatable with the rotation of the substrate holder to prevent the generation of static electricity between the top cover 80 and the substrate holder or chuck 60. The Examiner has interpreted this portion of the text of Tung to say that the cover is fixedly connected with the substrate holder in order to thereby be freely rotatable therewith, and that both elements are driven together by the motor 50. It is respectfully submitted that the Examiner has in this connection used impermissible hindsight (see the prohibition thereagainst recited in MPEP section 2141.01 III), since Tung in no way teaches or suggests that the cover is fixedly connected with the substrate holder in order to be freely rotatable therewith and also to be driven together by the motor 50. Applicants therefore respectfully traverse the Examiner's interpretation of this text, which it is submitted can be based only on hindsight gleaned from Applicants' teachings. Tung furthermore provides no suggestion as to how a synchronous rotation can be achieved, and thus only an arrangement as disclosed, for

example, in Yen would be possible, namely for separate drive motors to be provided for the cover and for the substrate holder, in contradistinction to Applicants' requirement for a single means for rotating both the substrate holder and the cover.

With regard to An et al, this reference discloses an apparatus for treating semiconductor wafers in a developer in order to remove byproducts of a previous developing from the wafer. The apparatus has a rotatable substrate holder, as well as a container that can be filled with developer and has a container cover. For treating the wafer, the developer is introduced into the container, and the rotatable substrate holder, with a wafer located thereon, is introduced via an upper opening of the container cover, into the container in order to submerge at least the underside of the wafer in the developer. Thus, the rotatable substrate holder of An in no way comes into engagement with the container, and furthermore the wafer is held spaced from a base of the container since the wafer could otherwise become damaged. Thus, the apparatus of An differs significantly from the aforementioned apparatus as well as from the present invention, so that it is respectfully submitted that one of ordinary skill in the art would have no motivation for considering or combining the cited art.

However, even if one of ordinary skill in the art were to combine the cited references as proposed by the Examiner, it is respectfully submitted that such a combination would not result in the subject matter of Applicants' claim 30. In particular, such a combination would not provide a cover that could be securable to a substrate holder such that the cover would be freely rotatable therewith.

Furthermore, such a combination would also not provide a notch in an outer region of a portion of the cover that defines a chamber, wherein the notch tapers

radially outwardly, i.e. is tapered in a radial direction, and wherein the notch is inclined on a side thereof that faces the substrate holder, all as required by Applicants' claim 30.

According to the Examiner, An teaches the use of a notch/groove that is tapered outwardly and inclined on a side thereof that faces the substrate holder in order to guide byproducts away from the substrate. Again, it is respectfully submitted that the Examiner is arbitrarily combining isolated features with features of other references without providing any motivation for doing so, even though MPEP section 706.02(j) requires that the initial burden is on the Examiner to provide some suggestion of the desirability of doing what the inventor has done.

Furthermore, if one assumes that one of ordinary skill in the art would even undertake a combination of the cited references, then pursuant to the Examiner's interpretation a downwardly tapered notch, such as illustrated at 70b in Fig. 12 of An, would be provided in a cover that is rotatable with the substrate holder. However, the notch or groove 70b of An has the effect that the liquid that is flung off from the wafer flows downwardly due to the force of gravity, since the container 70 in which the groove 70b is formed is stationarily held. However, if a groove 70b were to be integrated into a cover in the manner required by Applicants' claim 30, liquid that was flung-off from the substrate could initially not flow off, since due to the centrifugal forces the liquid would be flung outwardly since pursuant to the apparatus defined in Applicants' claim 30, the cover also rotates. Thus, with the provision of a groove 70b as shown in An, during the rotation the liquid would first move outwardly and upwardly due to the fact that the groove 70b of An is not tapered radially outwardly, as required by Applicants' claim 30, but rather is tapered downwardly in an axial direction. Due to the outward and upward

movement of the liquid in the An apparatus, there results the danger that the liquid moves to the substrate holder and also moves to and even over the plane of the backside of the substrate, thus providing the risk of contaminating the backside of the substrate. Thus, one of ordinary skill in the art would therefore have to not only transfer the groove in An to a cover as defined in Applicant's claim 30, but must also alter the cover in such a way that it is now tapered radially outwardly in order to convey coating medium away from the substrate due to the centrifugal force that acts on the cover.

In view of the foregoing discussion, Applicants respectfully submit that one of ordinary skill in the art would find no suggestion or desirability for combining the cited references. Furthermore, even if the references were combined, it is respectfully submitted that they would not provide the disclosure of Applicants' claims 30 and 51, especially since the Tung reference cannot be applied. Nonetheless, should the Examiner still have reservations about the patentability of the pending claims of the instant application, the undersigned respectfully requests a telephone interview to discuss any outstanding issues and to expedite placement of the application into condition for allowance.

Respectfully Submitted,



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